

WHAT IS CLAIMED IS:

1. A plasma processing apparatus comprising:
a processing chamber;
a microwave oscillator for generating
5 microwaves;
an antenna for radiating the microwaves to
said processing chamber;
a waveguide for introducing the
microwaves, which are generated by said microwave
10 oscillator, into said antenna;
a load matching device that is disposed on
said waveguide and that adjusts an impedance;
a wave detector that is disposed on said
waveguide and that detects the microwaves reflected from
15 said processing chamber; and
a controller for controlling said load
matching device to match an impedance of said processing
chamber, which is calculated based on the detected
microwaves measurement, with an impedance of said
20 microwave oscillator.

2. A plasma processing apparatus according to
Claim 1, wherein:
said controller comprises a load matching
device adjustment calculation unit for calculating an
25 amount of adjustment to which said load matching device
should be adjusted in order to match the impedance of
said processing chamber with the impedance of said
microwave oscillator; and an adjustment signal output
unit for transmitting as an adjustment signal a
30 calculated amount of adjustment multiplied by a
predetermined value smaller than 1; and
said load matching device is repeatedly
controlled until the impedance of said processing chamber
matches the impedance of said microwave oscillator.

35 3. A plasma processing apparatus according to
Claim 2, wherein:
said controller further comprises a plasma

detection unit that detects generation of plasma in said processing chamber;

5 if said plasma detection unit determines that no plasma is being generated, said adjustment signal output unit transmits an amount of adjustment, which said load matching device adjustment calculation unit has calculated, as an adjustment signal as it is;

10 if said plasma detection unit determines that plasma is being generated, said adjustment signal output unit transmits as an adjustment signal the amount of adjustment, which said load matching device adjustment calculation unit has calculated, multiplied by a predetermined value smaller than 1.

15 4. A plasma processing apparatus according to Claim 2, wherein:

 said controller further comprises an adjustment detection unit that detects a adjustment position by which said load matching device is adjusted;

20 said controller controls said load matching device according to a difference between the adjustment signal transmitted from said adjustment signal output unit and the signal of the adjustment position.

 5. A plasma processing apparatus according to Claim 1, wherein said load matching device has stubs.

25 6. A plasma processing apparatus according to Claim 1, wherein said load matching device has short plungers.

30 7. A control method for plasma processing apparatus that utilizes plasma generated by radiating microwaves to a processing chamber, comprising the steps of:

 calculating an impedance of processing chamber on the basis of the microwaves reflected from said processing chamber;

35 calculating an amount of adjustment, which is required in order to adjust the impedance of said processing chamber to match the calculated impedance of

said processing chamber with an impedance of the microwave oscillator;

transmitting as an adjustment signal the
calculated amount of adjustment multiplied by a
5 predetermined value smaller than 1; and

repeatedly controlling the impedance of
said processing chamber according to the transmitted
adjustment signal until the impedance of said processing
chamber matches the impedance of said microwave
10 oscillator.

8. A control method for plasma processing
apparatus according to Claim 7, wherein:

if no plasma is generated at said step of
transmitting a signal, the calculated amount of
15 adjustment is transmitted as an adjustment signal as it
is; and

if plasma is generated, the calculated
amount of adjustment multiplied by a predetermined value
smaller than 1 is transmitted as the adjustment signal.